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BEFORE THE BOARD OF PATENT APPEALS AND INTERFERENCES

Application Number: 09/944,083
Filing Date: August 31, 2001
Appellant(s): LEFKOWITZ ET AL.

Bret Field
For Appellant

EXAMINER'S ANSWER

This is in response to the appeal brief filed 05/02/2005 appealing from the Office action mailed 11/03/2004.

(1) Real Party in Interest

A statement identifying by name the real party in interest is contained in the brief.

(2) Related Appeals and Interferences

The examiner is not aware of any related appeals, interferences, or judicial proceedings, which will directly affect or be directly affected by or have a bearing on the Board's decision in the pending appeal.

(3) Status of Claims

The statement of the status of claims contained in the brief is correct.

(4) Status of Amendments After Final

The appellant's statement of the status of amendments after final rejection contained in the brief is correct.

(5) Summary of Claimed Subject Matter

The summary of claimed subject matter contained in the brief is correct.

(6) Grounds of Rejection to be Reviewed on Appeal

The appellant's statement of the grounds of rejection to be reviewed on appeal is correct.

(7) Claims Appendix

The copy of the appealed claims contained in the Appendix to the brief is correct.

(8) Evidence Relied Upon

No evidence is relied upon by the examiner in the rejection of the claims under appeal.

(9) Grounds of Rejection

The following ground(s) of rejection are applicable to the appealed claims:

1. Claims 7-26, and 44-51 are rejected under 35 U.S.C. 103(a) as being unpatentable over Wang et al. (US Patent 5,922,617; *filing date 11/12/1997*) and Bensimon et al. (US Patent 5,846,724; *filing date 01/28/1997*).

Wang et al. disclose methods and devices for rapidly screening a large number of events. The devices comprise of a microarray of bound components and the methods comprise of preparing the microarray (col. 2, lines 60-65). The method comprises modifying the surface of the solid substrate by the introduction of functionalities, which would react with the bound components (col. 3, lines 17-25 and 38-45). The functional group that is reactive to the bound components includes "for example, amino groups, activated halides, carboxyl groups, mercaptan groups, epoxides, and the like, may be provided in accordance with conventional ways. The linkages may be amides, amidines, amines, esters, ethers, thioethers, dithioethers, and the like". The bound components include nucleic acids and proteins (col. 3, lines 56-58; col. 5, lines 7-10). The microarray comprises a plurality of different components (col. 2, lines 60-65). The method of Wang et al. further comprises assaying the microarray by detecting the signal produced using

a disk scanner (col. 10, lines 16-25 and 50-62). The scanner would be connected to the computer through which the data is collected and process (col. 12, lines 59-67). Additionally with regard to claims 11-15, the type of functional group to be used for covalent bonding of the ligand to the surface of the substrate would be a choice of experimental design as evidenced by the cited prior art (col. 3, lines 38-45).

The method of Wang et al. does not expressly disclose the method step of contacting said surface with a derivatizing composition comprising at least a first silane having an olefin functional group to produce a substrate having a surface displaying olefin functional groups.

Bensimon et al. disclosed a method of making highly specific surfaces for biological reactions (Abstract; col. 3, lines 40-50). The method comprises functionalizing a support with a variety of silane derivatives that would result in a surface group with a double bond on the substrate (col. 5, lines 31-38) and directly anchoring the molecules of biological interest (col. 4, lines 5-25). The molecules of biological interest include molecules such as DNA, RNA, PNA, proteins, lipids and saccharides (col. 3, lines 44-45).

It would have been obvious to a person of ordinary skill in the art at the time the invention was made to modify the method by including the step of contacting said surface with a derivatizing composition comprising at least a first silane having an olefin functional group to produce a substrate having a surface displaying olefin functional groups as taught by Bensimon et al. in the method of Wang et al. One of ordinary skill in the art would have been motivated to modify the method by including the step of contacting said surface with a derivatizing composition comprising at least a first silane having an olefin functional group to produce a substrate having a surface displaying olefin functional groups in the method of Wang et al. for

the advantage of providing a surface having a reactivity that is highly pH-dependent (Bensimon: col. 6, lines 50-56) since both Wang et al. and Bensimon et al. disclose a method of functionalizing the surface of the solid for direct attachment of molecule of biological interest (Wang: col. 3, lines 38-45; Bensimon: col. 3, lines 40-50).

Furthermore, one of ordinary skill in the art would have reasonably expectation of success in the method combination of Wang et al. and Bensimon et al. because the method combination would produce a sufficiently specific array of biological molecules wherein the anchoring of the biological molecules does not require specific functionalization of the biological molecule and the ability to detect the isolated target of interest in a sample with a signal to noise ratio that is independent of the number of molecules in the sample.

2. Claims 7-26 and 44-51 are rejected under 35 U.S.C. 103(a) as being unpatentable over Pirrung et al. (US Patent 5,143,854) and Bensimon et al. (US Patent 5,677,126; *filing date 02/10/1995*).

Pirrung et al. disclose provides methods for forming predefined regions on a surface of a solid support, wherein the predefined regions are capable of immobilizing receptors (col. 8, lines 17-65; col. 30, lines 17-68). The method provides for the use of a substrate with a surface with a Linker molecule. The purpose of the linker molecules is to facilitate receptor recognition of the synthesized polymers on the substrate or a distal end of the linker molecules, a functional group. A single substrate supports comprise more than about 10 different monomer sequences that are randomly distributed on the surface (fig. 10M; col. 24, lines 45-47). When receptors immobilized in this way have a differential affinity for one or more ligands, screenings and

assays for the ligands can be conducted in the regions of the surface containing the receptors. Additionally, the attachment of the receptors to the surface of the substrate is from covalent bonding. The receptors include polynucleotides, nucleic acids, and peptides (col. 6, lines 41-59). The substrate is placed in a microscope detection apparatus for identification of locations where binding takes place (col. 4, lines 14-27).

The method of Pirrung et al. does not expressly disclose the method step of contacting said surface with a derivatizing composition comprising at least a first silane having an olefin functional group to produce a substrate having a surface displaying olefin functional groups.

Bensimon et al. disclosed a method of making highly specific surfaces for biological reactions (Abstract; col. 4, lines 13-23). The method comprises functionalizing a support with a variety of silane derivatives that would result in a surface group with a double bond on the substrate (col. 6, lines 6-13) and directly anchoring the molecules of biological interest (col. 4, lines 24-30, and 45-65). The molecules of biological interest include molecules such as DNA, RNA, PNA, proteins, lipids and saccharides (col. 4, lines 16-18).

It would have been obvious to a person of ordinary skill in the art at the time the invention was made to modify the method by including the step of contacting said surface with a derivatizing composition comprising at least a first silane having an olefin functional group to produce a substrate having a surface displaying olefin functional groups as taught by Bensimon et al. in the method of Pirrung et al. One of ordinary skill in the art would have been motivated to modify the method by including the step of contacting said surface with a derivatizing composition comprising at least a first silane having an olefin functional group to produce a substrate having a surface displaying olefin functional groups in the method of Pirrung et al. for

the advantage of providing a surface having a reactivity that is highly pH-dependent (Bensimon: col. 7, lines 26-32) since both Pirrung et al. and Bensimon et al. disclose a method of functionalizing the surface of the solid for direct attachment of molecule of biological interest (Pirrung: col. 8, lines 17-65; Bensimon: col. 4, lines 13-23).

Furthermore, one of ordinary skill in the art would have reasonably expectation of success in the method combination of Pirrung et al. and Bensimon et al. because the method combination would produce a sufficiently specific array of biological molecules wherein the anchoring of the biological molecules does not require specific functionalization of the biological molecule and the ability to detect the isolated target of interest in a sample with a signal to noise ratio that is independent of the number of molecules in the sample.

(10) Response to Argument

3. Claims 7-26, and 44-51 are rejected under 35 U.S.C. 103(a) as being unpatentable over Wang et al. (US Patent 5,922,617; *filing date 11/12/1997*) and Bensimon et al. (US Patent 5,846,724; *filing date 01/28/1997*).

DISCUSSION

Appellant has regrouped the claims of the rejection and argue each group separately. For Group I (Claims 7-10, 16-19, 50 and 51), appellant contends that neither Wang et al. nor Bensimon et al. teach or suggest the claimed method step of '*converting the olefin functional groups to ligand reactive functional groups*'. For Group II (Claims 11, 12, 20, and 21), appellant alleges that neither Wang et al. nor Bensimon et al. teach or suggest the claimed species of '*ligand reactive functional group*', i.e. '*an aldehyde*' (Claims 11 and 20) or '*a benzaldehyde*'

(Claims 12 and 21). For Group III (Claims 13 and 22), appellant contends that neither Wang et al. nor Bensimon et al. teach or suggest the claimed species of '*ligand reactive functional group*', i.e. '*carboxylate ester*'. For Group IV (Claims 14 and 23), appellant alleges that neither Wang et al. nor Bensimon et al. teach or suggest the claimed species of '*ligand reactive functional group*', i.e. '*amine*'. For Group V (Claims 15 and 24), appellant argues that neither Wang et al. nor Bensimon et al. teach or suggest the claimed species of '*ligand reactive functional group*', i.e. '*imidazolyl carbamate*'. Thus, the combine teachings of Wang et al. and Bensimon et al. do not render the method of the instant claims *prima facie* obvious.

Appellant's arguments are not convincing since the combine teachings of Wang et al. and Bensimon et al. do render the method of the instant claims *prima facie* obvious.

First, it is the examiner position that Bensimon et al. do teach or suggest the claimed method step of '*converting the olefin functional groups to ligand reactive functional groups*'. The claimed method step does not claim that '***a distinct ligand reactive moiety***' is produce in the conversion step and thus would not exclude the conversion step disclosed by Bensimon et al. in cited passage (col. 3, lines 40-50; col. 6, lines 47-56). Moreover, the instant specification defines the phrase '*ligand reactive functional groups*' as "*groups that react with moieties present on the target ligands, (i.e., the ligands to be deposited onto the surface and covalently bound thereto) in manner that produces a covalent bond or linkage between the ligand and the substrate surface*" (see paragraph [47] page 10, line 2 thru pg. 11, line 3). Bensimon et al. define the term "*anchoring*" as "*an attachment by covalent linkage resulting from a chemical reactivity or alternatively a noncovalent linkage resulting from physiochemical interactions*" (col. 3, lines 51-57). Therefore, the claimed method step of '*converting the olefin functional groups to ligand*

reactive functional groups' would not exclude the conversion step disclosed by Bensimon et al., and Bensimon et al. do teach or suggest the claimed method step of '*converting the olefin functional groups to ligand reactive functional groups*'.

Second, both Wang et al. and Bensimon et al. disclose that the bound 'ligand' can be indirectly bound to the substrate via intermediate(s), i.e. '***a distinct ligand reactive moiety***' as claimed in claims 11-15 and 20-24, (Wang: col. 3, lines 16-24, and 39-45; Bensimon: col. 7, lines 14-16) wherein the intermediate includes such linkages as aldehyde, amines, ester, and carboxylic functionalities (Wang: col. 4, lines 5-9; Bensimon: col. 5, lines 3-8). These functionalities would encompass the claimed species of '*ligand reactive functional group*' of the instant claims 11-15 and 20-24. Therefore, the combine teaching of Wang et al. and Bensimon et al. do suggest the claimed species of '*ligand reactive functional group*' of the instant claims 11-15 and 20-24.

Therefore, the combine teachings of Wang et al. and Bensimon et al. do render the method of the instant claims *prima facie* obvious.

4. Claims 7-26 and 44-51 are rejected under 35 U.S.C. 103(a) as being unpatentable over Pirrung et al. (US Patent 5,143,854) and Bensimon et al. (US Patent 5,677,126; *filing date 02/10/1995*).

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Appellant has regrouped the claims of the rejection and argue each group separately. For Group I (Claims 7-10, 16-19, 50 and 51), appellant alleges that neither Pirrung et al. nor Bensimon et al. teach or suggest the claimed method step of '*converting the olefin functional*

groups to ligand reactive functional groups'. For Group II (Claims 11, 12, 20, and 21), appellant argues that neither Pirrung et al. nor Bensimon et al. teach or suggest the claimed species of '*ligand reactive functional group*', i.e. '*an aldehyde*' (Claims 11 and 20) or '*a benzaldehyde*' (Claims 12 and 21). For Group III (Claims 13 and 22), appellant contends that neither Pirrung et al. nor Bensimon et al. teach or suggest the claimed species of '*ligand reactive functional group*', i.e. '*carboxylate ester*'. For Group IV (Claims 14 and 23), appellant alleges that neither Pirrung et al. nor Bensimon et al. teach or suggest the claimed species of '*ligand reactive functional group*', i.e. '*amine*'. For Group V (Claims 15 and 24), appellant argues that neither Pirrung et al. nor Bensimon et al. teach or suggest the claimed species of '*ligand reactive functional group*', i.e. '*imidazolyl carbamate*'. Thus, the combine teachings of Pirrung et al. and Bensimon et al. do not render the method of the instant claims *prima facie* obvious.

Appellant's arguments are not convincing since the combine teachings of Pirrung et al. and Bensimon et al. do render the method of the instant claims *prima facie* obvious.

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First, it is the examiner position that Bensimon et al. do teach or suggest the claimed method step of '*converting the olefin functional groups to ligand reactive functional groups*'. The claimed method step does not claim that '***a distinct ligand reactive moiety***' is produce in the conversion step and thus would not exclude the conversion step disclosed by Bensimon et al. in cited passage (col. 4, lines 12-22; col. 7, lines 25-32). Moreover, the instant specification defines the phrase '*ligand reactive functional groups*' as "*groups that react with moieties present on the target ligands, (i.e., the ligands to be deposited onto the surface and covalently bound thereto) in*

manner that produces a covalent bond or linkage between the ligand and the substrate surface" (see paragraph [47] page 10, line 2 thru pg. 11, line 3). Bensimon et al. define the term "*anchoring*" as "*an attachment by covalent linkage resulting from a chemical reactivity or alternatively a noncovalent linkage resulting from physiochemical interactions*" (col. 4, lines 23-29). Therefore, the claimed method step of '*converting the olefin functional groups to ligand reactive functional groups*' would not exclude the conversion step disclosed by Bensimon et al., and Bensimon et al. do teach or suggest the claimed method step of '*converting the olefin functional groups to ligand reactive functional groups*'.

Second, both Pirrung et al. and Bensimon et al. disclose that the bound 'ligand' can be indirectly bound to the substrate via intermediate(s), i.e. '***a distinct ligand reactive moiety***' as claimed in claims 11-15 and 20-24, (Pirrung: col. 11, line 66 thru col. 12, lines 11; Bensimon: col. 7, lines 58-60) wherein the intermediate includes such linkages as aldehyde, amines, ester, and carboxylic functionalities (Pirrung: col. 11, lines 60-62; Bensimon: col. 5, lines 43-48). These functionalities would encompass the claimed species of '*ligand reactive functional group*' of the instant claims 11-15 and 20-24. Therefore, the combine teaching of Pirrung et al. and Bensimon et al. do suggest the claimed species of '*ligand reactive functional group*' of the instant claims 11-15 and 20-24.

Therefore, the combine teachings of Pirrung et al. and Bensimon et al. do render the method of the instant claims *prima facie* obvious.

For the above reasons, it is believed that the rejections should be sustained.

Respectfully submitted,

Examiner: My-Chau Tran
October 11, 2005

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